

**MANIPAL UNIVERSITY****FIFTH SEMESTER B. ARCH. DEGREE EXAMINATION – NOVEMBER 2015****SUBJECT: ARC 305 - BUILDING CODES AND BYELAWS  
(2010 SCHEME)**

Thursday, November 19, 2015

Time: 10:00 – 13:00 Hrs.

Max. Marks: 50

☒ Answer any FIVE full questions.

☒ Assume missing data if any.

1. Determine which of the following sentences are true (T) and which are false (F).

- 1A. Travel distance can be increased by 50% for fully sprinklered buildings
- 1B. Minimum number of fire exit stairs in a high rise building is 2
- 1C. Maximum number of risers per flight is 15 for fire exit stairs
- 1D. Minimum intersection spacing in collector streets is 150m
- 1E. ECS for bicycle is 0.10
- 1F. Design speed and design volume increases with increase in hierarchy of road
- 1G. Maximum area that can be built at ground floor level depends on both permissible ground coverage and building envelope
- 1H. An architect is not liable for work executed on site
- 1I. Occupancy certificate does not state use of the building
- 1J. Minimum height of a habitable room is 2.1

(1 mark × 10 = 10 marks)

2. Write notes on the following. Provide sketches where applicable.

- 2A. Building height
- 2B. Basement
- 2C. Interior open space
- 2D. Refuge area
- 2E. Parking lane

(2 marks × 5 = 10 marks)

3. Draw the site plan and site elevations (front and side) indicating the building volume for the following:

Use: Residential

Site: 10m × 20m (shorter side facing the access road)

R.O.W.: 6.0m

Maximize F. A. R. consumption

(10 marks)



4. Draw toilet layout showing fixtures, doors and windows for the following:

Use: Non-residential school

Students: 200

External wall: One

(10 marks)

5. Draw ground floor and typical floor plans showing exit corridors and fire exit stairs. Draw detailed plan and section of fire staircase in 1:50.

Use: Business

Site: 50m × 100m (shorter side facing the access road)

R.O.W.: 24.0m

Maximize F.A.R consumption.

Assume 3.75m floor to floor height. Assume Type 1 construction.

Height of the building shall be above 25.5m up to 40.0m

(10 marks)

6. Write notes on the following. Give necessary sketches.

6A. Doors and windows for wheelchair users

6B. Responsibilities of an architect in obtaining building permit

(5 marks × 2 = 10 marks)

Table 3 Maximum Permissible Floor Area Ratio

Sl. No.	Width of Means of Access (m)	Use Groups of Buildings			
		Residential Buildings	Educational Buildings	Industrial, Storage and Hazardous Buildings	Assembly, Institutional Business, Mercantile Buildings including Mixed use Buildings
1.	Below 2.4	Nil	Nil	Nil	Nil
2.	Above 2.4 to 3.5	1.25	Nil	Nil	Nil
3.	Above 3.5 to 7.0	1.75	Nil	Nil	Nil
4.	Above 7.0 to 9.0	2.00	2.00	Nil	Nil
5.	Above 9.0 to 15.0	2.25	2.25	2.00	2.00
6.	Above 15.0 to 20.0	2.50	2.50	2.00	2.25
7.	Above 20.0 to 24.0	2.75	2.75	2.00	2.50
8.	Above 24.0	3.00	3.00	2.00	2.75



#### 74. Permissible Height of Buildings

(1) The permissible height of the buildings on means of access of different widths shall be as given in Table 5 below:

Width of Means of Access (in m.)	Permissible Height of Building (in m.)	Permissible Height of Building (in m.)
		In case of free gifting of strip of land having a width of 2.5 m. throughout the frontage of the entire plot.
(i) above 2.4 upto 3.0	7.0	Nil
(ii) above 3.0 upto 5.0	10.0	12.5
(iii) above 5.0 upto 7.0	12.5	15.5
(iv) above 7.0 upto 9.0	20.0	25.5
(v) above 9.0 upto 12.0	40.0	-
(vi) above 12.0 upto 15.0	60.0	-
(vii) above 15.0	No restriction	-

#### Ground Coverage for Building

Occupancy or Use Group	Maximum Percentage of Ground Coverage	
	Plot Size up to 200 sq. m.	Plot Size up to 500 sq. m. or more
Residential	60%	50%
Educational	50%	45%
Institutional	40%	40%
Assembly	40%	40%
Mercantile (Retail)	40%	40%
Industrial	40%	40%
Storage	40%	40%
Business	40%	40%

#### 62. Minimum open spaces with respect to buildings for residential use

Height of building	Front open space	Open space on side-1	Open space on side-2	Rear open space
Upto 7.0 m	1.2 m	1.2 m	1.2 m	2.0 m
Above 7.0 m upto 10.0 m	1.2 m	1.2 m	1.2 m	3.0 m
Above 10.0 m upto 12.5 m	1.2 m	1.2 m	1.5 m	3.0 m
Above 12.5 m upto 15.5 m	2.0 m	1.5 m	2.5 m	4.0 m
Above 15.5 m upto 20.0 m	3.5 m	4.0 m	4.0 m	5.0 m
Above 20.0 m upto 25.5 m	5.0 m	5.0 m	5.0 m	6.5 m
Above 25.5 m upto 40.0 m	6.0 m	6.5 m	6.5 m	8.5 m
Above 40.0 m upto 60.0 m	8.0 m	8.0 m	8.0 m	10.0 m
Above 60.0 m upto 80.0 m	10.0 m	15% of the height of the Building	15% of the height of the Building	12.0 m
Above 80.0 m	12.0 m	15% of the height of the Building	15% of the height of the Building	14.0 m



64. Minimum open spaces with respect to buildings for institutional, assembly, business, mercantile and mixed uses

Height of building	Front open space	Open space on side-1	Open space on side-2	Rear open space
Upto 10.0 m for land area upto 500.0 sq. m	2.0 m	1.2 m	4.0 m	4.0 m
Upto 10.0 m for land area above 500.0 sq. m	3.0 m	3.5 m	4.0 m	4.0 m
Above 10.0 m upto 20.0 M	4.0 m	4.0 m	4.0 m	5.0 m
Above 20.0 m upto 25.5 m	5.0 m	5.0 m	5.0 m	6.0 m
Above 25.5 m upto 40.0 m	6.0 m	6.5 m	6.5 m	9.0 m
Above 40.0 m	8.0 m	9.0 m	9.0 m	10.0 m
Above 60.0 m upto 80.0 m	10.0 m	15% of the height of the Building	15% of the height of the Building	12.0 m
Above 80.0 m	12.0 m	15% of the height of the Building	15% of the height of the Building	14.0 m

Off-street Car Parking Space

Occupancy	Car Parking Space Requirement
Residential	<p>(1) Building with single tenement –</p> <p>(a) For a building having one tenement of less than 100 sq. m. in floor area – no car parking space.</p> <p>(b) For a building having a tenement of 100 sq. m. or more but less than 200 sq. m. of floor area – one car parking space.</p> <p>(c) For a building having one tenement of 200 sq. m. or more of floor area – one car parking space for every 200 sq. m.</p>

Table 19 Schools and Educational Institutions

(Clause 5.2.5.1)

Sl No.	Fixtures	Nursery School	Non-Residential		Residential	
			Boys	Girls	Boys	Girls
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Water-closets	1 per 15 pupils or part thereof	1 per 40 pupils or part thereof	1 per 25 pupils or part thereof	1 per 8 pupils or part thereof	1 per 6 pupils or part thereof
ii)	Ablution tap	One in each water-closet 1 water tap with draining arrangements shall be provided for every 50 persons or part thereof in the vicinity of water-closets and urinals	One in each water-closet	One in each water-closet	One in each water-closet	One in each water-closet
iii)	Urinals	—	1 per 20 pupils or part thereof	—	1 per 25 pupils or part thereof	—
iv)	Washbasins	1 per 15 pupils or part thereof	1 per 60 pupils or part thereof	1 per 40 pupils or part thereof	1 per 8 pupils or part thereof	1 per 6 pupils or part thereof
v)	Bath/Showers	1 per 40 pupils or part thereof	—	—	1 per 8 pupils or part thereof	1 per 6 pupils or part thereof
vi)	Drinking water fountain or taps	1 per 50 pupils or part thereof	1 per 50 pupils or part thereof	1 per 50 pupils or part thereof	1 per 50 pupils or part thereof	1 per 50 pupils or part thereof
vii)	Cleaner's sink				1 per each floor	

NOTES

1 Some WC's may be European style if desired.

2 For teaching staff, the schedule of fixtures to be provided shall be the same as in case of office building.



**Table 20 Occupant Load**  
(Clause 4.3)

Sl No.	Group of Occupancy	Occupant Load, Floor Area in m <sup>2</sup> /Person
(1)	(2)	(3)
i)	Residential (A)	12.5
ii)	Educational (B)	4
iii)	Institutional (C)	15 (see Note 1)
iv)	Assembly (D)	
	a) With fixed or loose seats and dance floors	0.6 (see Note 2)
	b) Without seating facilities including dining rooms	1.5 (see Note 2)
v)	Mercantile (F)	
	a) Street floor and sales basement	3
	b) Upper sale floors	6
vi)	Business and industrial (E&G)	10
vii)	Storage (H)	30
viii)	Hazardous (J)	10

**Table 21 Occupants per Unit Exit Width**  
(Clauses 4.4.2, 4.4.3 and C-1.6.2)

Sl No.	Group of Occupancy	Number of Occupants		
		Stairways	Ramps	Doors
(1)	(2)	(3)	(4)	(5)
i)	Residential (A)	25	50	75
ii)	Educational (B)	25	50	75
iii)	Institutional (C)	25	50	75
iv)	Assembly (D)	40	50	60
v)	Business (E)	50	60	75
vi)	Mercantile (F)	50	60	75
vii)	Industrial (G)	50	60	75
viii)	Storage (H)	50	60	75
ix)	Hazardous (J)	25	30	40

**Fire exit staircase: minimum requirements**

Category of Building	Area per floor	Width of the Stairway (Mtr)	Minimum No. of Staircase (Height upto 12.5 Mtrs.)	Minimum No. of Staircase (Height Above 12.5 Mtrs.)
Educational	Upto 500 sq. m.	1.35	1	2
	Above 500 sq. m.	2.0	2	2
Assembly	Upto 500 sq. m.	1.50	1	2
	Above 500 sq. m.	2.0	2	2
Institutional	Upto 500 sq. m.	1.50	1	2
	Above 500 sq. m.	2.0	2	2
Business	Upto 500 sq. m.	1.50	1	2
	Above 500 sq. m.	1.50	2	2
Mercantile (Retail)	Upto 500 sq. m.	1.80	2	2
	Above 500 sq. m.	2.00	2	2

